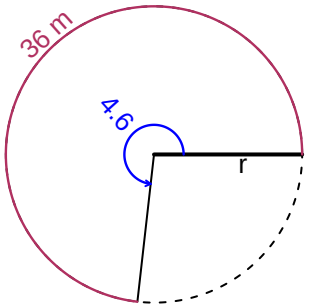
Name: Date:

Trig Final (SLTN v677)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 36 meters. The angle measure is 4.6 radians. How long is the radius in meters?

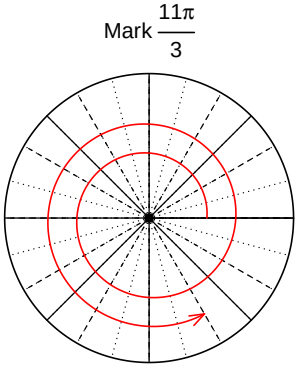


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

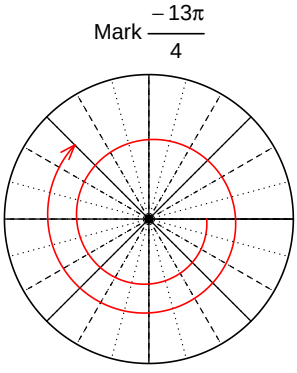
$r = 7.826$ meters.

Question 2

Consider angles $\frac{11\pi}{3}$ and $\frac{-13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{3}\right)$ and $\sin\left(\frac{-13\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/3)$



Find $\sin(-13\pi/4)$

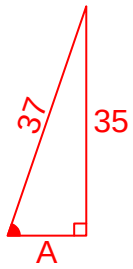
$\cos(11\pi/3) = \frac{1}{2}$

$\sin(-13\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{35}{37}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.

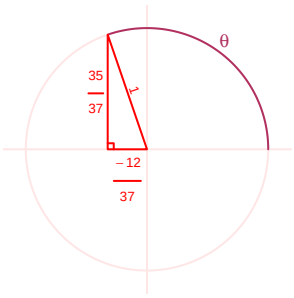
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 35^2 = 37^2$$
$$A = \sqrt{37^2 - 35^2}$$
$$A = 12$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\tan(\theta) = \frac{\frac{35}{37}}{\frac{-12}{37}} = \frac{-35}{12}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 4.43 Hz, an amplitude of 9 meters, and a midline at $y = 2.99$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 9\sin(2\pi 4.43t) + 2.99$$

or

$$y = 9\sin(8.86\pi t) + 2.99$$

or

$$y = 9\sin(27.83t) + 2.99$$